Declaration of Jerrold T. Bushberg
Exhibit 3

APPENDIX B

NORTH HIGHLANDS CELLULAR FACILITY REPORT

AUGUST 1990

INTRODUCTION

This document provides the results of the measurement and evaluation of electromagnetic fields at the North Highlands Cellular Site located adjacent to the California Highway Patrol Station (Figure 1). These measurements were requested by Kirk Fanning representing Cellular One at 1750 Howe Avenue, Suite 320, Sacramento, California 95825.

MEASURING EQUIPMENT

One of the instruments used to measure the electromagnetic fields was a Holaday Industries Model HI-3001 Broadband Exposure Meter, Serial No. 58292, with the associated probe GRE-01, Serial No. 364A. The probe and meter were calibrated by the manufacturer on June 19, 1990. The Holaday meter senses electric fields in the frequency range from 0.5 MHz to 6000 MHz and indicates field strength in units of V^2/m^2. This field reading can be converted to an equivalent far-field power density in units of mW/cm^2 by using an appropriate multiplier. The dynamic range of this instrument is between 0.003 and 2653 mW/cm^2. The data supplied by Holaday Industries sets forth the frequency response of the probes as ± 1 dB and calibration accuracy and isotropicity as ± 0.5 dB each. The probe is isotopic, meaning that it can directly measure the strength of complicated fields, independent of orientation, polarization, or arrival angle.

The second instrument used to measure the fields was the Narda Microwave Model 8616 Electronic Radiation Monitor, Serial 27049, with the associated probe 8621C, Serial No. 19107. The probe and

meter were calibrated by the manufacturer on October 1, 1989. The Narda meter sense electric fields in the frequency range of 300 MHz to 40,000 MHz and indicates in units of mW/cm^2. The dynamic range of this instrument is between 0.001 and 20 mW/cm^2. The data supplied by Narda Microwave sets forth the frequency response of the probe as $\pm$1.25 dB, calibration accuracy as $\pm$0.5 dB, and isotropicity as $\pm$1 dB.

MEASUREMENT PROCEDURE

Measurements were taken by me between August 6 and August 30, 1990. The initial measurements taken on August 6, 7, and 8, 1990 included continuous monitoring under normal operating conditions over the following time periods: 7:00 a.m. - 10:20 a.m., 11:00 a.m. - 2:15 p.m., and 4:00 p.m. - 12:45 a.m. A full power test was also performed on August 30, 1990 between 7:30 p.m. and 9:30 p.m. during which all 48 transmitters were activated to simulate the maximum possible exposure condition. Measurements were made at the base of the tower and at a nearby residential location (5022 Clearwood Way). The residential measurement was repeated with all transmission power shut off to assess the contribution of this telecommunications facility to the overall electromagnetic environment. Results are reported to include the minimum and maximum (i.e., range) and average time weighted exposure. Results are given in Table 1 as the ground level electromagnetic power density in mW/cm^2.

ANALYSIS AND SUMMARY

Table 1 tabulates the measurements taken at each location with each meter. The electromagnetic field surveyed was sensitive to frequencies from 0.5 to 40,000 MHz. Results are expressed in mW/cm^2. Only very weak electromagnetic radiation fields were sensed by either the Holaday or Narda meter at the location immediately adjacent to the cellular tower. In all other locations both meters indicated even lower power densities.

The two most widely recognized standards for protection against radio-frequency exposure are the American National Standards Institute 1982 Radio Frequency Protection Guide (C95.1), Table 2a and the National Council on Radiation Protection and Measurement 1986 Radio Frequency Protection Guide, Table 2b. The 1982 ANSI standard takes into account energy absorption differences at various frequencies and time weighted exposures to a maximum thermal load of 0.4 W/kg of body weight. Resting thermal load is approximately 1 W/kg of body weight. The threshold for thermal effects is approximately 4 W/kg; therefore, the standard represents at least ten fold safety factor for thermal effects. The 1982 ANSI standard is being revised and is expected to be released at the end of 1990 or early 1991. Indications are that the new ANSI standard will follow closely the recommendations made by the NCRP. The NCRP exposure guidelines differ from the 1982 ANSI standard protection guide in that separate exposure levels are recommended for workers and for the general public (Figure 2). The NCRP recommended that the average exposure limits for the public be generally one-fifth that of the limits recommended for workers,

although the averaging time specified for public exposure was 30 minutes rather than the 6 minute period for worker exposure. The NCRP noted that its two-tier recommendation was more traditional and consistent with past NCRP practices in differentiating between occupational and public exposure by providing for a greater margin of safety for the general public. Exposure guidelines have also been issued by the International Radiation Protection Association (IRPA) and by the American Council of Governmental Industrial Hygienists (ACGIH). The IRPA guidelines are similar to the NCRP recommendations in that the greater degree of protection is recommended for the general public than for workers. The ACGIH guidelines are basically a modified version of the 1982 ANSI guidelines and only apply to workers.

All the measurements taken under normal operating conditions indicate power densities less than 0.015 mW/cm^2 which represents approximately 0.52% of the most restrictive ANSI standard and approximately 3.1% of the most restrictive NCRP standard for the frequencies associated with this facility. These power densities are not atypical of ambient electromagnetic microwave radiation fields adjacent to cities utilizing microwave telecommunications systems.

The peak power densities measured under maximal operating condition adjacent to the transmitting tower and at a nearby residence (location b) were 0.03 and 0.002 mW/cm^2 respectively. Even the highest measurement adjacent to the tower represents less than 6% of the maximal safe public exposure level set by the NCRP (the most restrictive standard) for this transmission frequency.

The highest residential exposure was less than 0.5% of the NCRP Public Exposure Standard.

There is no reason to suspect that the electromagnetic radiation fields associated with this facility will significantly exceed the values measured. Taking into consideration the available scientific evidence, the exposure standards are set at levels which provide for a substantial safety margin against potentially harmful biological effects. No clinically significant adverse biological effects have been associated with these frequencies of electromagnetic radiation at the power densities measured.

Table 1

RESULTS OF THE ELECTROMAGNETIC RADIATION FIELD STRENGTH MEASUREMENTS AT THE NORTH HIGHLANDS CELLULAR ONE TELECOMMUNICATIONS TOWER SITE

Point No.	Location	Date	Time	Condition	Narda Meter (300-40,000 MHz) mW/cm² Range	Narda Meter (300-40,000 MHz) mW/cm² Average	Holaday Meter (0.5-6,000 MHz) mW/cm² Range	Holaday Meter (0.5-6,000 MHz) mW/cm² Average	Percent of most restrictive ANSI Standard	Percent of most restrictive NCRP Standard
1	a	8/6/90	7:00 a.m.	N	<0.001	<0.001	0.0003-0.001	0.0008	0.03	0.2
2	b	8/6/90	7:10-9:00 a.m.	N	<0.001	<0.001	0.0003-0.001	0.0008	0.03	0.2
3	c	8/6/90	9:15 a.m.	N	<0.001	<0.001	0.0003-0.001	0.0008	0.03	0.2
4	d	8/6/90	9:30 a.m.	N	<0.001	<0.001	<0.0003	<0.0003	0	0
5	e	8/6/90	9:45 a.m.	N	0.006-0.008	0.006	0.004-0.01	0.008	0.34	2.0
6	f	8/6/90	10:00 a.m.	N	<0.001	<0.001	0.0003-0.002	0.001	0.07	0.4
7	g	8/6/90	10:20 a.m.	N	<0.001	<0.001	<0.0003	<0.0003	0	0
8	a	8/7/90	4:00 p.m.	N	<0.001	<0.001	0.002-0.001	0.0008	0.03	0.2
9	b	8/7/90	4:10-7:00 p.m.	N	0.001-0.008	0.004	0.0003-0.0012	0.001	0.03	0.2
10	c	8/7/90	7:15 p.m.	N	<0.001	<0.001	<0.0003	<0.0003	0	0
11	d	8/7/90	7:30 p.m.	N	<0.001	<0.001	<0.0003	<0.0003	0	0
12	e	8/7/90	7:45 p.m.	N	0.001-0.006	0.002	0.0003-0.01	0.004	0.34	2.0
13	f	8/7/90	8:00 p.m.	N	0.001-0.002	0.001	0.0003-0.002	0.001	0.07	0.4
14	g	8/7/90	8:20 p.m.	N	<0.001	<0.001	<0.0003	<0.0003	0	0
15	a	8/7/90	9:30 p.m.	N	<0.001	<0.001	0.0006-0.001	0.0008	0.03	0.2
16	b	8/7/90	9:40-11:40 p.m.	N	<0.001	<0.001	0.0003-0.001	0.0008	0.03	0.2
17	c	8/7/90	11:45 p.m.	N	<0.001	<0.001	<0.0003	<0.0003	0	0
18	d	8/7/90	12:00 a.m.	N	<0.001	<0.001	<0.0003	<0.0003	0	0
19	e	8/7/90	12:15 a.m.	N	<0.001	<0.001	<0.0003	<0.0003	0	0
20	f	8/7/90	12:30 a.m.	N	<0.001	<0.001	<0.0003	<0.0003	0	0
21	g	8/7/90	12:45 a.m.	N	<0.001	<0.001	<0.0003	<0.0003	0	0
22	a	8/8/90	11:00 a.m.	N	<0.001	<0.001	0.0003-0.001	0.0006	0.03	0.2
23	b	8/8/90	11:15 a.m.-1:00 p.m.	N	0.001-0.002	0.001	0.0004-0.0015	0.001	0.05	0.3
24	c	8/8/90	1:15 p.m.	N	<0.001	<0.001	0.0003-0.001	0.0008	0.03	0.4
25	d	8/8/90	1:30 p.m.	N	<0.001	<0.001	<0.0003	<0.0003	0	0
26	e	8/8/90	1:45 p.m.	N	0.003-0.02	0.01	0.005-0.015	0.01	0.52	3.1

Table 1 continued...

RESULTS OF THE ELECTROMAGNETIC RADIATION FIELD STRENGTH MEASUREMENTS AT THE NORTH HIGHLANDS CELLULAR ONE TELECOMMUNICATIONS TOWER SITE

Point No.	Location	Date	Time	Condition	Narda Meter (300-40,000 MHz) mW/cm² Range	Narda Meter (300-40,000 MHz) mW/cm² Average	Holaday Meter (0.5-6,000 MHz) mW/cm² Range	Holaday Meter (0.5-6,000 MHz) mW/cm² Average	Percent of most restrictive ANSI Standard	Percent of most restrictive NCRP Standard
27	f	8/8/90	2:00 p.m.	N	<0.001	<0.001	0.003-0.0018	0.001	0.06	0.36
28	g	8/8/90	2:15 p.m.	N	<0.001	<0.001	<0.0003	<0.0003	0	0
29	f	8/30/90	7:30 p.m.	N	<0.001	<0.001	0.0003-0.0015	0.0007	0.05	0.3
30	f	8/30/90	8:45 p.m.	MPT	0.02-0.03	0.02	0.02-0.03	0.03	1.04	6.0
31	b	8/30/90	9:00 p.m.	MPT	0.002-0.002	0.002	0.002-0.002	0.002	0.07	0.4
32	b	8/30/90	9:10 p.m.	TPO	<0.001	<0.001	<0.0003	<0.0003	0	0

+With the exception of points 2, 9, 16, and 23, all measurements represent a 0.1 hr measurement interval according to ANSI exposure standards.

Location Index

a. 4410 Coffee Lane
b. 5022 Clearwood Way
c. Corner of Coffee Lane and Clearwood Way
d. Corner of Tyler and Mieko
e. California Highway Patrol parking lot
f. 100 feet from the base of the cellular tower at 120° ARC
g. Corner of Tresler and Hillsdale

Condition Index

N = Normal Operation
MPT = Maximum Transmitting Power
TPO = Transmitting Power Off

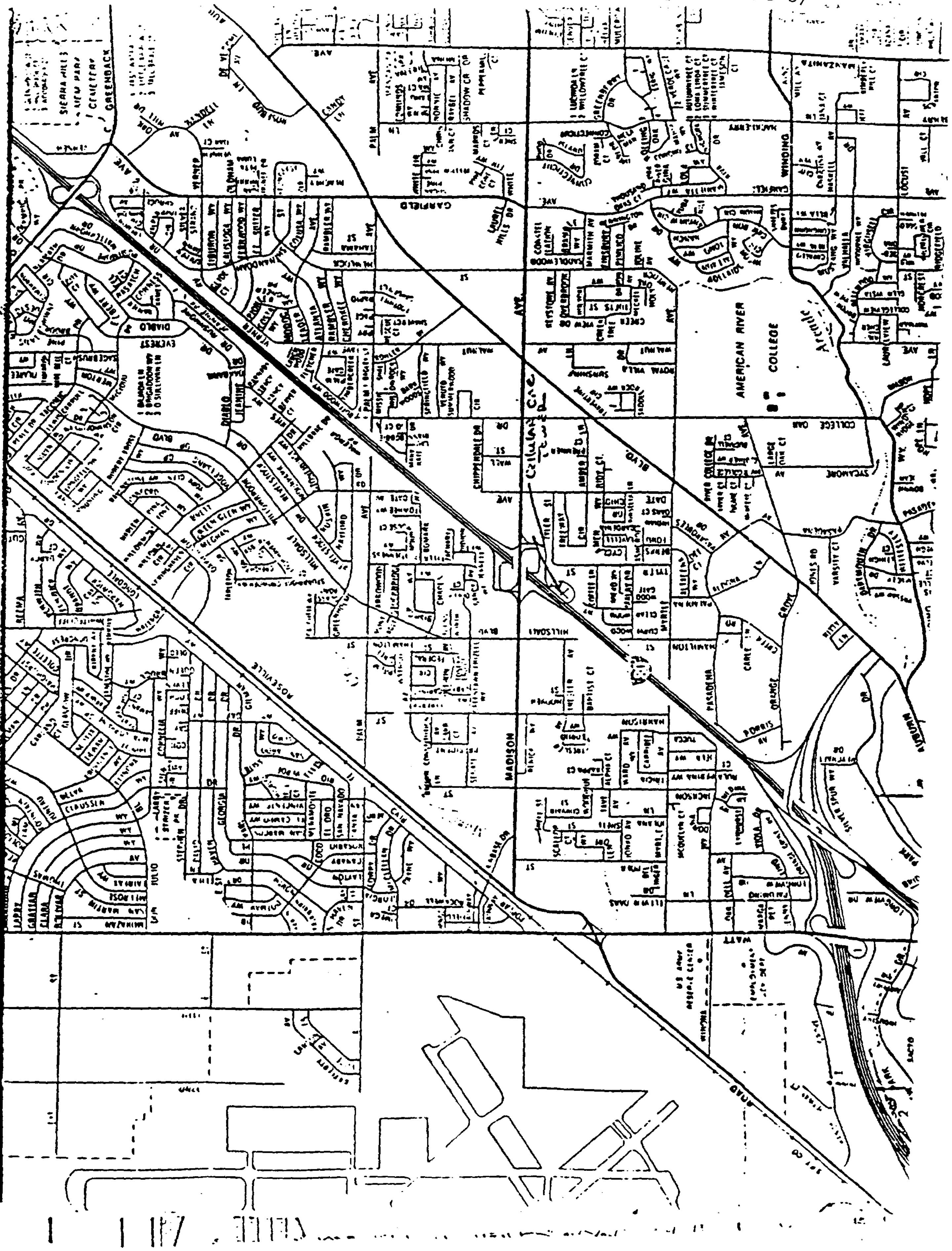

Figure 1
NORTH HIGHLANDS CELLULAR SITE

Table 2a

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
1982 RADIOFREQUENCY PROTECTION GUIDE

Frequency Range (MHz)	Electric Field Strength (V^2/M^2)	Magnetic Field Strength (A^2/M^2)	Power Density (mW/cm^2)
0.3-3	400,000	2.5	100
3-30	4,000 ($900/f^2$)	0.025 ($900/f^2$)	$900/f^2$
30-300	4,000	0.025	1.0
300-1500	4,000 (f/300)	0.025 (f/300)	f/300
1500-100,000	20,000	0.125	5.0

Table 2b

NATIONAL COUNCIL ON RADIATION PROTECTION AND MEASUREMENTS
1986 RADIOFREQUENCY PROTECTION GUIDE

Frequency Range (MHz)	Electric Field Strength (V^2/M^2)	Magnetic Field Strength (A^2/M^2)	Power Density (mW/cm^2)
0.3-3	400,000	2.5	20
3-30	——	——	$180/f^2$
30-300	750	0.0053	0.2
300-1500	——	——	f/1500
1500-100,000	4000	0.027	1.0

NOTE: f = frequency in megahertz
E^2 = electric field strength squared
H^2 = magnetic field strength squared
V^2/m^2 = volts squared per meter squared
A^2/m^2 = amperes squared per meter squared
mW/cm^2 = milliwatts per centimeter squared

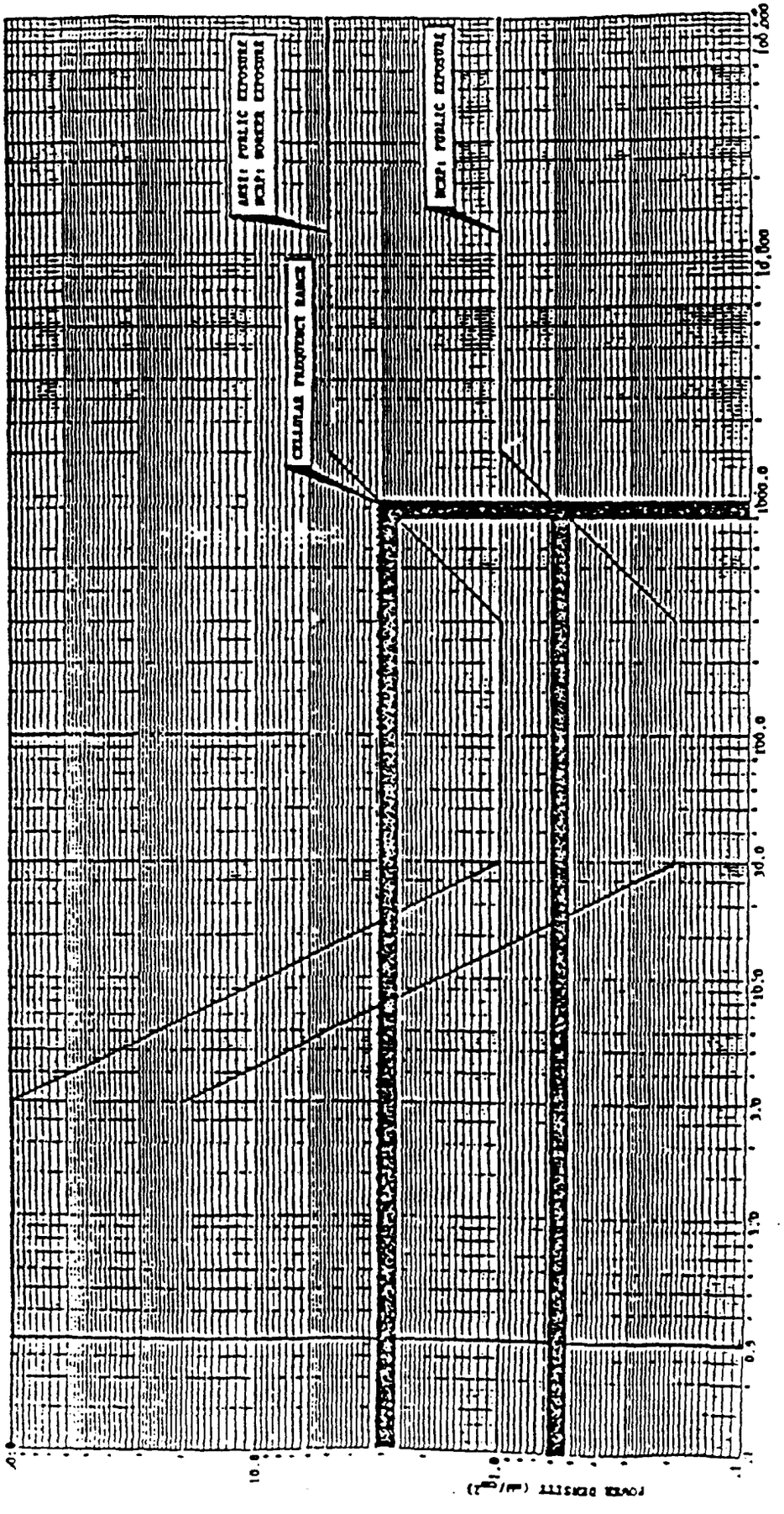

Figure 2

Radio frequency Protection Guides (RPG) for whole body exposure of human beings as established by ANSI and NCRP.